CLAIMS

What is claimed is:

1. A method of converting seismic traces to petrophysical properties comprising:

(a) deriving a combined log seismic response filter from at least one petrophysical log in a well and at least one seismic trace substantially near at least one well;

(b) convolving the combined log seismic response filter to convert the seismic traces to at least one log of petrophysical properties;

(c) outputting at least one log of petrophysical properties from step (b).

2. The method of claim 1 wherein the at least one log of petrophysical properties of step (d) is outputted as a two-dimensional cross-section.

3. The method of claim 1 wherein the seismic survey of step (a) is a two-dimensional seismic survey substantially near the well.

4. The method of claim 1 wherein the seismic survey of step (a) is a three-dimensional seismic survey of the area around the at least on well.

5. The method of claim 4 wherein the at least one log of petrophysical properties of step (d) is outputted as three-dimensional property volume cube.

6. The method of claim 1 wherein the petrophysical log from at least one well in step (a) is selected from the group comprising Gamma Ray, V-shale, porosity, density, net-to-gross, resistivity, hydrocarbon saturation, flow permeability, and any combination thereof.

7. The method of claim 1 wherein the at least one log of petrophysical properties of step (d) outputted is selected from the group consisting of Gamma Ray, V-shale, porosity, density, net-to-gross, resistivity, hydrocarbon saturation, flow permeability, and any combination thereof.

8. The method of claim 1 further comprising drilling a well in the three-dimensional seismic survey to obtain at least one petrophysical log of the well and using the petrophysical log in step (a).

9. The method of claim 1 wherein the combined log and seismic response is derived from the equation:

$$c(t)= h_{log}(t)_k * l_{seis}(t)_k^{-1}$$

wherein $c(t)$ is the combined log and seismic response, $h_{log}(t)_k$ ***is the*** high frequency well log response at location k, and $l_{seis}(t)_k$ is the low frequency seismic response at location k.

10. A method of converting a three-dimensional seismic volume cube of an area to a three-dimensional petrophysical property volume cube comprising:

(a) obtaining a three-dimensional seismic volume cube from a seismic survey of the area;

(b) drilling a well in the area;

(c) obtaining at least one petrophysical log from the well drilled in the area;

(d) deriving a combined log seismic response (CLSR) filter from a log and at least one seismic trace near the well;

(e) converting seismic wiggles traces to petrophysical properties by convolving the CLSR filter with each seismic trace;

(f) Outputting the petrophysical properties as a three-dimensional property volume cube.

11. The method of claim 10 wherein the petrophysical log in step (c) is selected from the group consisting of gamma ray log, resistivity log, porosity log, density log, or sonic log and any combination thereof.

12. The method of claim 10 wherein the seismic traces are connected in all spatial locations.

13. The method of claim 10 wherein the petrophysical property volume cube outputted is selected from the group consisting of Gamma Ray, V-shale, porosity, density, net-to-gross, resistivity, hydrocarbon saturation, flow permeability, and any combination thereof.

14. The method of claim 1 wherein the combined log and seismic response is derived from the equation:

$$c(t) = h_{log}(t)_k * l_{seis}(t)_k^{-1}$$

wherein $c(t)$ is the combined log and seismic response, $h_{log}(t)_k$ is the high frequency well log response at location k, and $l_{seis}(t)_k^{-1}$ is the low frequency seismic response at location k.

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